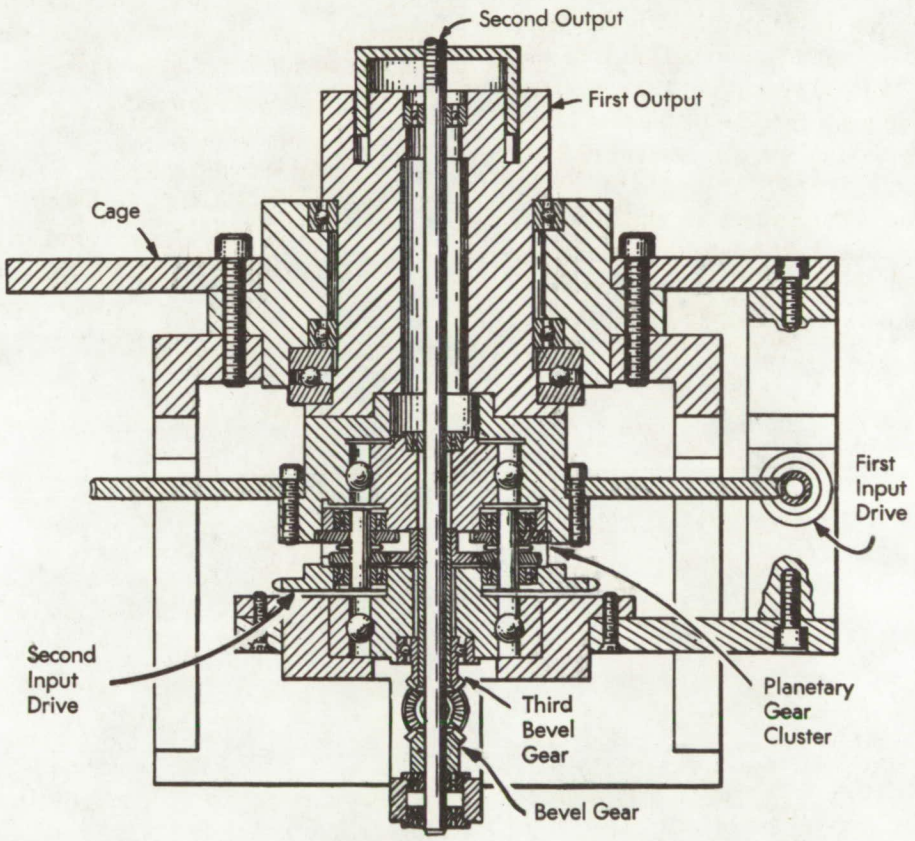
NASA TECH BRIEF

Ames Research Center

Mechanical Planetary Compensating Drive System



A planetary gear drive has been devised which enables two concentric output shafts to be controlled independently or rotated as a unit. Some other devices which ostensibly perform the same function have interactions which lead to large cumulative errors in types of mechanical systems because of the rotation of one shaft while the other is stationary. Moreover, other devices with noninteracting outputs cannot provide continuous rotation of both outputs unless the motor drives mounted on them are equipped with electrical slip rings.

The diagram is a longitudinal sectional view of the concentric output differential gearing arrangement of the device. The second output shaft is mounted on ball bearings held within the body of the first output shaft. Moreover, the rotational output of the second

(continued overleaf)

shaft can be converted to provide a limited translational movement by a sleeve which is threaded onto the second shaft, as indicated in the diagram, and keyed to the first output shaft.

The first output shaft is directly connected to a worm wheel driven by a worm (the first input) which is journaled to the cage. The second output shaft is connected to the bevel gear indicated in the diagram; in turn, this bevel gear is driven by a bevel-gear idler which is powered by a third bevel gear that is attached to the sun gear of the planetary gear cluster, as indicated in the diagram. The planetary gear cluster (four) is attached to the carriage sprocket serving as a sprocket chain second input drive. Thus, rotation of the second input drive causes the planetary gears to rotate within the circle defined by an outer ring gear (attached to the first output shaft) and the sun gear; since the sun gear drives the third bevel gear, the second output shaft is rotated without effect on the first output shaft. However, because of the planetary cluster and outer ring gear, rotation of the first input shaft is translated into equal angular motion of both output shafts.

The bevel gearing arrangement in the diagram drives the second output shaft opposite to the rotation of the second input drive; if the bevel gearing is omitted and the sun gear is connected directly to the second output shaft, the rotations will be in the same direction.

Possible uses are pointing and tracking devices, rotary camera shutters with variable light control, gimbal systems with yaw and pitch movement, spectrometer mirror scanning devices, etc.

Note:

Requests for further information may be directed to:

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Reference: TSP 73-10497

Patent status:

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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